Saskatchewan Agriculture, Food and Rural Revitalization

FARM Facts

Sustainable Grazing of Saskatchewan's Forested Rangeland

Introduction

Saskatchewan's forested rangeland supports a diverse number of uses, including grazing, forestry, tourism and recreation. How this rangeland is managed and used for domestic livestock has a direct impact on other land uses and values. Livestock grazing can change a forested area's plant composition and the quality of plant life. It can also have an effect on soil properties, water shed functioning and many wildlife species that depend on these areas. Healthy forested rangeland is essential to soil and water conservation, nutrient cycling, air quality and other ecosystem functions that directly or indirectly benefit everyone.

Grazing response and assessing range condition

Aspen is the dominant tree cover in much of the grazed forested rangeland. Aspen occurs over a wide range of moisture and nutrient conditions. As a result, a variety of understory communities can be identified based on the dominant shrubs and herbs present. In these communities, livestock will exhibit preferences for certain species, due mainly to palatability and availability factors. However, there are a number of species with similar responses to grazing in all community types. The designation as a *decreaser*, *increaser* or *invader* in response to grazing is based on a comparison of grazed to ungrazed stands of similar type. Response to grazing of some of the more common understory plants in these communities is given in Table 1.

There are a number of methods for estimating range condition in forested communities. All methods consider one or more of the following site conditions:

- understory composition;
- understory structure (height and density of grass, forb and shrub layers);
- overall productivity of palatable species;
- aspen regeneration; and
- litter levels on the forest floor.

The most preferred method of range condition assessment in forested rangeland focuses on the understory vegetation, comparing grazed areas to ungrazed areas or areas receiving little use. The vegetation component is the focus of range condition assessment simply because it provides direct feedback on the impact of grazing. Vegetation assessments are more indicative and sensitive to the health of the resource than using other indicators such as animal production or stocking rates.

Overgrazing has the potential to reduce or eliminate the palatable understory species from the shrub, grass and forb layers. Continued overgrazing can result in the establishment of invader species, exposure of soil, soil compaction, reduced water infiltration and lack of aspen regeneration. In addition, riparian areas that are preferred grazing areas can become severely degraded due to trampling and over use. These degraded riparian areas are often prone to establishment of invader species such as Canada thistle and foxtail barley.

Range use

To determine proper levels of use on forested rangeland, it is important to consider use of key species in key areas. Key species and key areas serve as indicators of management effectiveness.

TABLE 1 Response of Understory Plants to Grazing

Decreasers GRASSES	FORBS	SHRUBS
Fringed brome	Peavine	Saskatoon
Needlegrasses	Vetch	Aspen saplings
Slender wheatgrass	Showy aster	Red-osier dogwood
Awned wheatgrass	Sarsaparilla*	Chokecherry
Aspen ricegrass	Fireweed*	Hazelnut

* Observations indicate that the decreaser response to grazing is mainly as a result of trampling.

Increasers GRASSES	FORBS	SHRUBS
Hairy wildrye	Dewberry	Bearberry
Sheep fescue	Baneberry	Alder
Northern ricegrass	Bunchberry	Balsam poplar saplings
	Pussytoes	Snowberry
	Yarrow	Twining honeysuckle

Invaders GRASSES
Rough hairgrass
Kentucky bluegrass
Smooth brome
FORBS
Silverweed
Canada thistle
Sow thistle
Dandelion
Absinthe

In most cases, one to three plants are used as key species. These plants should be abundant, productive and palatable.

Key species are usually decreaser species that are valuable for livestock grazing. Decreaser species will be in short supply if the range has been overgrazed, but they have the potential to become abundant if grazing pressure is reduced. Species such as aspen ricegrass, cream-colored vetchling, peavine and Saskatoon can be used as key species.

Forested rangeland should be managed to maintain these species. When the frequency of these species begins to decline, it indicates overgrazing. Key areas are the portions of range that serve as indicators of range condition, trend or degree of use.

The key area concept is based on the idea that no range of appreciable size will be used uniformly. Key areas will be located in areas where livestock prefer to graze, but should not be located in close proximity to water sites, salting areas or where livestock congregate for reasons other than grazing. An indicator of grazing sustainability is the abundance of key species in key areas.

The level of use of the current year's growth that palatable vegetation can withstand without lasting detrimental effects is sometimes referred to as the proper use level (PUL).

The PUL varies depending on the type of vegetation and the season of use as indicated in Table 2. The PUL must also consider use and potential use by wildlife throughout the year.

TABLE 2 *Maximum Proper Use Levels for Palatable Vegetation Types on Mixed-wood Range*

Vegetation	Season	Proper Use Level
Herbaceous Forage	Growing	50%
Herbaceous Forage	Dormant	70%
Browse	All	50%

Source: Dr. A. Bailey (University of Alberta)

Determining primary, secondary and non-use range

Grazing land can be separated into primary, secondary and non-use ranges. Primary range is considered to be the areas that animals prefer to use when management is low. The areas that are lightly used or unused by livestock under minimal management are considered secondary range and will ordinarily not be fully used until the primary range has been over used. Areas that livestock will not use for grazing are considered non-use range.

In forested rangeland, primary range tends to be those areas close to entry points, water sources and open meadows that are easily accessible. Secondary range tends to be those areas that have limited use because of distance to water, slope or poor access, due to terrain or vegetation. Non-use ranges are those areas that are not suited to livestock grazing such as solid spruce or jack pine bluffs. However, these areas may still be used by livestock for cover and shelter.

Grazing management in forested rangeland strives to increase the amount of primary range by reducing the amount of secondary range. Fencing, water development, salting, herding and access trail construction are all effective tools. It is important to remember that even with improved management not all secondary range will be used effectively; therefore, only the expected increase in use should be considered when determining stocking rates.

Many of the large tracts of forested rangeland are important for a variety of uses (particularly wildlife), rather than solely for livestock production. In some cases, there is potential for competition of livestock with wildlife species for food, water or space. In situations such as this, it has been suggested that the concept of managing for optimum livestock distribution and use may not be desirable. The maintenance of primary grazing areas with a gradient to areas of non-use by livestock may be a more suitable management approach. Where multiple-use management for wildlife and livestock is important, greater emphasis needs to be placed on stocking rates, time of grazing, range classification, setting practical objectives and planning.

TABLE 3 *Initial Stocking Rates for Various Forest Community Types*

Community Type	Stocking Rate (AUM*/acre)
Aspen/Rose	.15 - .25
Aspen/Buffaloberry	.15 - .25
Aspen/Willow	.15 - .25
Aspen/Rose/Dogwood	.15 - .30
Aspen/Cranberry/Arali	.15 - .30
Aspen/Hazelnut/Saskatoon	.1 - .2
Balsam/Poplar-Aspen/Dogwood	.1 - .2
White Spruce/Aspen/Rose	.1 - .2
Pine/Bearberry	non-use areas
White Spruce/Moss	non-use areas
Black Spruce/Labrador Tea	non-use areas
Riparian (i.e. willow/sedge, lakeshore, etc.)	.4 - 1.2

**AUM - animal unit months*

Setting initial stocking rates

The most important management consideration for any grazing program is matching forage use to availability. The productivity of forested rangeland is largely related to tree cover. The resulting shading effect of a dense tree cover limits the growth of grasses and other forage plants, reducing the suitability of the site for livestock grazing. Less dense tree cover allows for greater light penetration, and the development of a more pronounced shrub and forb layer. Productivity of the understory is also related to the nutrient status of the soil on which different tree species occur.

Forested rangeland has a wide range of forage yields. Yields from various sites in *The Saskatchewan Benchmark Project* (1990-1994) show variations in yields in excess of 1,100 pounds per acre. The ranges in initial stocking rates in Table 3 reflect this variability.

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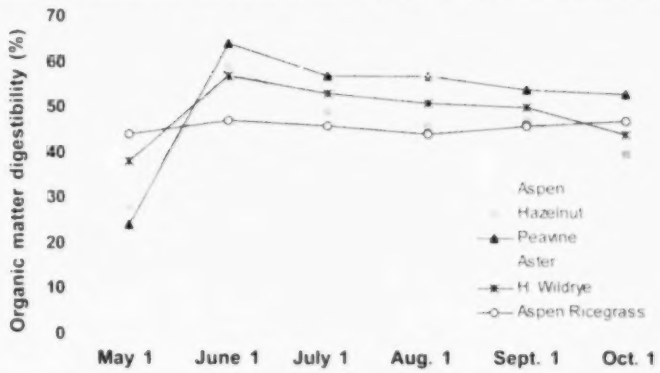
The classification of community types is a basic starting point to assess the grazing potential of forested rangeland. The use of a rigid stocking rate for aspen and other forest types is not recommended, as not enough information is yet known on yields or grazing response of understory plants. For this reason, an initial stocking rate should be selected and a monitoring plan should be implemented to fine tune the stocking rate over the course of the grazing season and subsequent years.

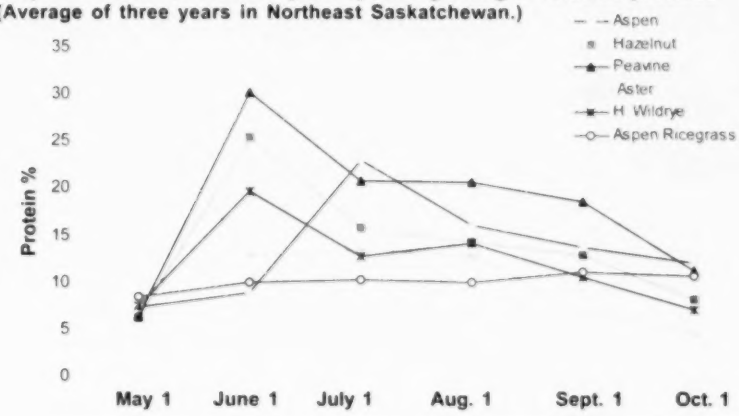
Balancing the number of animals and/or the level of use with the forage supply are important in range planning. However, there are many factors that should be considered when setting an initial stocking rate, including:

1. What is the condition and approximate yield of palatable forage plants?
2. When is the best period to graze the forest?
3. How long should the forest be grazed?
4. What level of forage use is acceptable considering the present condition of the understory vegetation?
5. How do livestock distribute themselves in the forest and what proportion is primary, secondary and non-use range?

Graph 1: Organic matter digestibility of common plant species growing in forested pastures. (Average of three years in Northeast Saskatchewan.)



Graph 2: Protein of common plant species growing in forested pastures (Average of three years in Northeast Saskatchewan.)



Source: *Nutrient content and digestibility of Saskatchewan range plants.*

Season of use

Next to proper stocking rate, season of use is probably the most important management consideration. For forested rangeland, season of use is important for maximizing both forage value and production.

Forage value is related to both the nutritional value of a forage species and its preference by the animal species concerned (i.e. cattle, deer, etc.). Cattle tend to be grazers. Although cattle prefer grasses and forbs, browse species can make up a considerable portion of their diets on forested rangeland.

Many plant species in forested rangeland make good quality forage for livestock. Forage value is highest in the spring and declines as the grazing season progresses (Graph 1 and 2).

Forested rangeland is generally considered ready for grazing in mid-June. As forbs and shrubs often dominate understory communities, grazing taking place earlier than mid-June can have negative impacts on forage production. If grazed too early, growing points are removed and plants may not grow again for the rest of the season. Also, grazing too early does not allow plants to replenish energy used to over winter. Thus, delaying grazing until significant growth has occurred will increase the yearly productivity of the range.

Grazing on forested rangeland should be completed by early fall. On forested rangeland, forage plants lose most of their nutrient value following the first killing frost that often occurs at this time.

If forested rangeland is required for a longer season, extend the grazing season in the fall rather than put livestock on earlier in the spring. This will result in less impact on the vegetation, as plants are more tolerant of defoliation during periods of dormancy. Low forage quality in the fall can be overcome by supplemental feeding. Mineral supplementation is recommended during all grazing periods.

Grazing systems for aspen range

Intensive grazing systems for forested rangeland are impractical. Stocking rates are low, often making investments in capital improvements such as fencing and water sites uneconomical. The cost of capital improvements may be much higher on forested rangeland than grassland. Access for equipment, as well as site preparation for both water sites and fence lines, often involves clearing and breaking, resulting in higher costs. Long-term maintenance costs will also be higher due to tree-fall and wildlife damage, as well as aspen regrowth control on fence lines and trails.

TABLE 4 Criteria for Monitoring Grazing on Forested Rangeland

Grazing Criteria	Indications of Understory Decline	Indicators of Understory Maintenance or Recovery
Palatable Shrubs	Close hedging, grazing line very evident, two year old growth relatively short, portions of plants dead, reduced leaf size.	Little to moderate hedging, grazing line inconspicuous, two year old growth relatively long, leaf size not reduced.
Palatable Forbs	Lack of vigour, height, leaf size and number of seed stalks are reduced, initiation of spring growth delayed.	Vigorous growth, normal leaf size, initiation of spring growth not delayed.
Current Year's Growth	PUL (proper use level) of key species and less palatable species exceeded.	PUL of key species not exceeded, less palatable species receive little or no use.
Long-term Plant Vigour and Production	Key palatable species eliminated, increased presence of invader species, litter layer reduced, signs of soil exposure and complications.	Key palatable species abundant and vigorous understory structure present with layers of grasses, forbs and shrubs.
Aspen Regeneration	Scarcity of aspen regeneration, height reduced due to grazing.	Aspen regeneration present, height not consistently reduced due to grazing.

However, on large tracts of productive range where distribution is a problem, some expenditure on additional water sites, fencing and trail development may be appropriate. Proper location of developed pastures, fencing, salting and watering areas may increase use of less preferred areas. Trail development can provide livestock with access through areas of thick brush or rough topography. Trails connecting open meadows can greatly improve the grazing efficiency in forested rangeland.

The best grazing system for forested rangeland is a complimentary system with seeded pastures. This system uses tame forages for early- and late-season use and relies on the forested rangeland for grazing from mid-June to early fall.

Monitoring

Monitoring is extremely important in forested rangeland. Monitoring should be carried out on a frequent basis in order to assess the current level of forage use so stocking rates can be adjusted. Utilization measurements on key areas can be used to estimate proper stocking levels under current management practices. Monitoring provides the basis on which to make decisions on range readiness, when to move livestock and degree of use. It also allows producers to identify problem areas early before they become serious.

Longer term monitoring normally focuses more on the changes in the understory structure and composition. These changes can often be quite slow and subtle, and therefore monitoring of this nature is carried out generally every three years. Monitoring and evaluation are the keys to determine when management changes are needed. It is critical that both monitoring sites and methods be sensitive to changes in the resource. The sites chosen for monitoring must therefore be sensitive to current management and changes in weather patterns, changes in livestock distribution, and should also reflect short and long-term objectives. Some guidelines to use when monitoring forested rangeland are presented in Table 4.

Conclusion

The basic principles for management of forested rangeland are the same as those for native grassland. Planning and the setting of practical goals and objectives will provide the starting point for management practices. Stocking rates, monitoring season of use and distribution practices are all components of a range-management plan that can help producers meet their goals and objectives for forested rangeland.

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